

WHAT IS CLAIMED IS:

1. An processing apparatus comprising:

a control unit for processing an operation instruction which does not prescribed a functional specification, as a

5 specific application-purpose operation instruction; and

a specific application-purpose instruction operating unit for supporting a flexible pipeline structure and capable of being designed to carry out an operation of the specific application-purpose operation instruction for each

10 application field.

2. The information processing apparatus according to claim 1, wherein

said specific application-purpose instruction

15 operating unit is built in as an IP.

3. The information processing apparatus according to claim 1, wherein

said control unit and said specific

20 application-purpose instruction operating unit are provided within the processor core.

4. The information processing apparatus according to claim 1, further comprising a rewritable register provided

25 within a processor core,

wherein said rewritable register prescribes a number of cycles from when an instruction of said specific application-purpose instruction operating unit is issued to when it becomes possible to use a result is provided within  
5 a processor core, and

issuing of the instructions is controlled based on said number of cycles.

5. The information processing apparatus according to  
10 claim 1, further comprising a rewritable register provided within a processor core,

wherein said rewritable register prescribes a number of cycles from when an instruction of said specific application-purpose instruction operating unit is issued to  
15 when it becomes possible to issue the same instructions, and

issuing of the same succeeding instructions is controlled based on said number of cycles.

6. The information processing apparatus according to  
20 claim 1, further comprising a flag provided within a processor core,

wherein said flag changes over between a case where the number of cycles from when an instruction of said specific application-purpose instruction operating unit is issued to  
25 when it becomes possible to issue the same succeeding

instructions becomes the same as the number of cycles from when an instruction of the specific application-purpose instruction operating unit is issued to when it becomes possible to use a result and a case where it is possible to issue the same succeeding instructions in each cycle, and issuing of the instructions is controlled based on the flag.

7. An information processing apparatus which detects an operation exception that may occur during execution of a specific application-purpose operation instruction and carries out an exceptional processing when the operation exception is detected, said information processing apparatus comprising:

15 a saving unit which saves a context after the execution of a program has been interrupted;

a confirmation unit which confirms whether or not an operation exception has been detected during the execution of the specific application-purpose operation instruction;

20 an exception processing unit which carries out an exceptional processing when an operation exception is detected during the execution of a specific application-purpose operation instruction; and

a return unit which returns from an interruption.

8. The information processing apparatus according to claim 7, further comprising:

a second confirmation unit which confirms whether or not the operation state has been set to a state in which the operation exception which occurs during the execution of a specific application-purpose operation instruction can be detected.

9. The information processing apparatus according to claim 7, further comprising:

a third confirmation unit which confirms whether an instruction for breaking is the specific application-purpose operation instruction.

10. The information processing apparatus according to claim 7, further comprising:

a memory which stores a value which indicates detection of the operation exception during the execution of the specific application-purpose operation instruction, and it is confirmed whether an operation exception has been detected or not by referring to the content of said memory.

11. An exception processing method of a specific application-purpose operation instruction for detecting an operation exception which occurs during execution of a

specific application-purpose operation instruction and for carrying out an exceptional processing when the operation exception is detected, the exception processing method comprising the steps of:

5        saving a context after the execution of a program has been interrupted;

         confirming whether the operation exception has been detected during the execution of the specific application-purpose operation instruction;

10       carrying out the exceptional processing when it is confirmed that the operation exception has been detected during the execution of a specific application-purpose operation instruction; and

         returning from an interruption.

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12. The exception processing method according to claim 11, further comprising the step of:

         confirming whether the operation state has been set to a state in which the operation exception which occurs during  
20 the execution of a specific application-purpose operation instruction can be detected.

13. The exception processing method according to claim 11, further comprising the step of:

25        confirming whether an instruction for breaking is the

specific application-purpose operation instruction.

14. The exception processing method according claim 11, further comprising the step of:

5 storing a value which indicates detection of the operation exception during the execution of the specific application-purpose operation instruction in a memory, and confirming whether an operation exception has been detected or not by referring to the content of said memory.

10 15. The exception processing method according to claim 12, further comprising the step of:

storing a value in a register or a flag, said value indicates that the operation state has been set to a state  
15 that an operation exception that occurs during the execution of a specific application-purpose operation instruction can be detected, and

confirming whether the operation state has been set to a state that an operation exception is detected or not,  
20 by referring to said register or said flag.

16. The exception processing method according to claim 12, wherein

there is provided an instruction for setting a state  
25 that an operation exception that occurs during the execution

of the specific application-purpose operation instruction is detected, and it is confirmed whether an instruction is the instruction for setting a state that an operation exception that occurs during the execution of the specific application-purpose operation instruction is detected.

17. The exception processing method according to claim 12, further comprising the step of:

storing a value in a register or a flag, said value indicates that an instruction address that has interrupted the execution of a program is for detecting an operation exception that occurs during the execution of a specific application-purpose operation instruction can be detected, and

confirming whether the operation state has been set to a state that an operation exception is detected or not, by referring to the content of said register or said flag.

18. The exception processing method according to claim 12, further comprising the step of:

storing a value which indicates a breakpoint for detecting an operation exception that occurs during the execution of the specific application-purpose operation instruction in a memory, and

confirming whether the operation state has been set

to a state that an operation exception is detected or not,  
by referring to the content of said memory.

19. An information processing apparatus that has a specific  
5 application-purpose operation instruction, said information  
processing apparatus comprising:

an operation exception detection flag which indicates  
whether an operation exception has been detected;

- 10 a specific application-purpose operation instruction  
executing unit which sets said operation exception detection  
flag to a valid state when an operation exception has been  
detected during the execution of the specific  
application-purpose operation instruction;

- 15 a flag control unit which notifies to an interruption  
control unit that an interruption due to an operation  
exception of the specific application-purpose operation  
instruction is to be generated, when said operation exception  
detection flag has been set to a valid state during the  
execution of a trap instruction for generating an  
20 interruption; and

wherein said interruption control unit carries out a  
control relating to the generation of an interruption, when  
said interruption control unit has received a notice that  
the interruption is generated.



20. The information processing apparatus according to claim 19, wherein

when said flag control unit has received an operation exception detection flag invalidate instruction, said flag control unit invalidates said operation exception detection flag.

21. The information processing apparatus according to claim 19, wherein

when said flag control unit has received an operation exception detection flag read instruction, said flag control unit reads the value of said operation exception detection flag.

22. The information processing apparatus according to claim 19, wherein

when said flag control unit has received an operation exception detection flag write instruction, said flag control unit writes a value into said operation exception detection flag.

23. The information processing apparatus according to claim 19, wherein

said information processing apparatus has an instruction having an operational function specialized for

an image processing as the specific application-purpose operation instruction.

24. An information processing apparatus that has a specific application-purpose operation instruction, said information processing apparatus comprising:

an operation exception detection flag which indicates whether an operation exception has been detected;

- 10 a condition code register that is set based on a value that is held in said operation exception detection flag;

- a specific application-purpose operation instruction executing unit which sets said operation exception detection flag to a valid state when an operation exception has been detected during the execution of the specific application-purpose operation instruction;

15 a flag control unit that sets the condition code register based on a value that is held in said operation exception detection flag;

- a branch/interruption return instruction control unit which determines whether an interruption is generated or not based on a value held in said condition code register and a value shown by the instruction field, during the execution of a trap instruction for generating an interruption, and, when an interruption is to be generated, that notifies to an interruption control unit that an interruption due to an

operation exception of a specific application-purpose operation instruction is to be generated; and

wherein said interruption control unit carries out a control relating to the generation of an interruption, when  
5 said interruption control unit has received a notice that the interruption is generated.

25. The information processing apparatus according to claim 24, wherein

10 when said flag control unit has received an operation exception detection flag invalidate instruction, said flag control unit invalidates said operation exception detection flag.

15 26. The information processing apparatus according to claim 24, wherein

when said flag control unit has received an operation exception detection flag read instruction, said flag control unit reads the value of said operation exception detection  
20 flag.

27. The information processing apparatus according to claim 24, wherein

when said flag control unit has received an operation  
25 exception detection flag write instruction, said flag control

unit writes a value into said operation exception detection flag.

28. The information processing apparatus according to  
5 claim 24, wherein

said information processing apparatus has an instruction having an operational function specialized for an image processing as the specific application-purpose operation instruction.

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29. An exception processing method of a specific application-purpose operation instruction for detecting an operation exception which may occur during execution of a specific application-purpose operation instruction and for  
15 carrying out an exceptional processing when such an operation exception is detected, the exception processing method comprising the steps of:

setting an operation exception detection flag that shows a detection of an operation exception, to a valid state,  
20 when an operation exception has been detected during the execution of the specific application-purpose operation instruction;

notifying that an interruption due to an operation exception of the specific application-purpose operation  
25 instruction is generated, when said operation exception

detection flag has been set to a valid state during the execution of a trap instruction for generating an interruption; and

5 carrying out a control relating to the generation of an interruption, when a notice that the interruption is generated has been received.

30. An information processing apparatus comprising:

an executing unit which executes a computer program  
10 containing a specific application-purpose operation instruction;

a detection unit which detects whether an operation exception has occurred during execution of the specific application-purpose operation instruction;

15 an execution interrupting unit which makes said executing unit temporarily stop the execution of the computer program when said detection unit detects an operation exception;

a saving unit which saves a context when said detection  
20 unit detects occurrence of an operation exception;

an exception processing unit which performs an exceptional processing when said detection unit detects occurrence of an operation exception; and

an execution re-start unit which makes said executing  
25 unit restart the execution of the computer program after the

exceptional processing by said exception processing unit is completed.

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